BALNEOLOGY IN THE MIDDLE AGES.

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To-day we probably bathe our patients more often and in more varied ways than ever before. Every conceivable medium into which man may safely be put has found its therapeutic application. The subject has been subdivided by specializing adherents, so that the general term of balneology is rapidly becoming obsolete. Here, as everywhere, the stress of the times is upon us, and it is therefore with a certain hesitation that I attempt to impose upon your time and goodwill with a theme no longer of general importance, and from a remote age usually thought to be bare of practical achievement. If, nevertheless, I do so, it is because it would seem that just as we find it profitable to consult from time to time the workers in other lands, just so we should not fail to reap benefit from the labours of our forbears. Of course, if we do it only as searchers after the strange and curious, or as collectors of fine books, which in their vellum or pigskin bindings lend tone and dignity to our shelves, we bring a certain joy into our routine existence without entering, however, into the spirit and real meaning of another epoch. This we can only do when we study the sources themselves and judge them by themselves and not in relation to any other time, particularly not to our

own. Then only we can acquire the historical sense which does not measure everything by the standard of material and technical advancement. Approached in this spirit, it will be found that the Middle Ages, of all historical epochs the most niggardly treated, is apt to radiate an inspiring amount of light from its reputed darkness. What has been lacking, and to a great extent still lacks, is a sufficient amount of documentary evidence. Increasingly this is being brought to light from archives and libraries furnishing the building material for such brilliant syntheses as Dr. J. J. Walsh's "The Thirteenth Greatest of all Centuries," or Henry Osborn Taylor's "Medieval Mind."

From our civilization of strenuous progressiveness and innumerable bath-tubs we gaze sympathetically to that of ancient Rome, with its luxurious thermæ and other provisions for bathing in health and illness. There is something romantic in such contemplation and gratifying to our pride, inasmuch as we imagine the intervening historical periods as steeped in filth and unbathed bliss. We are told that only in the seventeenth and eighteenth centuries the apostles of water and cleanliness arose, Locke, Floyer and J. J. Rousseau, and to them alone we give credit for our own superlative cleanliness. The facts opposing this traditional view are so numerous that I can endeavour only to cite some of them in chronological sequence, in order to give a bird's-eye view on bathing Europe up to the advent of that cultural epoch known as the Renaissance.

Balneology, usually regarded as one of the empirical branches of therapy, has never enjoyed great favour from that school of medicine whose prime endeavour is, and almost always has been, to raise itself to a position among the exact sciences. The mediæval physician aimed at therapy primarily, and while inclined to rely on authority, he was

not afraid to use common sense and to pay attention to popular remedies, among which the bath was probably one of the earliest. The ancient Greek and Roman writers who belonged to the school of medicine—Hippocrates and Galen, for instance—mention balneological measures only sparingly, while the lay writers—Livy, Horace, and Celsus—go to great length and detail. We have to turn to men of no particular scientific standing like Antonius Musa, who, because he cured the divine Augustus with cold bathing, is usually cited as the founder of hydrotherapy; to Charmis, who in Nero's time revived sea bathing. Only in the tenth century a book was written by a great physician, Paul of Ægina, in which for the first time balneology was comprehensively outlined, including a systematic discussion of the different mineral waters and their therapeutic value for various ailments. Paul's work is like a posthumous message from an older to a newer civilization, the latter differently constituted by admixtures of new blood. It exerted, of course, no influence on the balneology of the early Middle Ages, which was well under way then.[1]

It has been asserted that mediæval balneology developed entirely independently of its classical prototype. This seems an exaggeration, for it is well known that most of the invading kings of Italy made efforts to copy the Roman model and restore the ancient order of things. Theodoric, the Ostrogoth, certainly did. Though by no means lacking in powerful individuality, his court and government were shaped on the better Roman models. It is to his

[1] Paul of Ægina may also be called the first medical historian of balneology, because in his works is found a comprehensive statement of the baths therapeutically employed in antiquity (*see* the edition of his works by Francis Adams, vol. i, pp. 67-73).

Byzantine physician, Anthimus, that we owe the first and only medical treatise of the time which enjoyed a long popularity. We also have a letter from Theodoric to his architect, Aloysius, which, if authentic, would constitute the earliest document on our subject in the Middle Ages. In it Theodoric dwells on the advantages of baths and mineral springs, mentioning those of Abano, near Padua, and orders Aloysius to repair the ancient installations.[2] But indirectly the greatest influence was exerted by Cassiodorus, whom Theodoric had taken over from Odoacer and invested with the highest positions of state. From him we have that interesting decree outlining the duties of the official physicians, but his help to balneology we can see particularly in his efforts to induce the monastic institutions to a cultivation of intellectual and medical pursuits.

But I must leave off here for a moment in order to analyse from another point of view the origin of bathing habits among those northern tribes whose national peculiarities gave the determining colour to the whole epoch. It may be assumed as a general proposition that primitive people had a more fervent belief in the powers of healing springs, and that they made early use of them. Archæological research not only in Europe and Asia, but also in America (Aztec and Indian), have revealed the ancient provisions for bathing in water and in steam. We also know that the North American Indians would fight in the defence

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[2] "Sive in thermis, sive in cuniculis fuerit aliquid reparandum." Quite a considerable literature about Abano appeared already in the Middle Ages (*see* Köstl, "Die Euganeen oder die Thermen von Abano," 1843). Ennodius, Bishop of Pavia (died 521), went to Abano for treatment of an eye trouble. He wrote one of the earliest and best poems in praise of these baths.

of their healing springs. The earliest reports we have about the Teutonic tribes mention uniformly their love of bathing. Thus Cæsar tells us of their bathing and swimming in rivers, and Tacitus specifically speaks of their hot baths.[3] Useful evidence of the autochthonous origin and development of their bathing habits may be found in a study of the words used by them to designate the various applications of water to the body and the changes which the sense of these words underwent in the course of time. In the English-Latin dictionary of the fifteenth century, the "Promptuarium Parvulorum," we find the two words "*bathyn*" or "*stuwyn*" for the Latin "*balneo*." These are without doubt old Germanic words, related in no way to any Romance tongue. On the contrary, it can be shown that the latter took them up. Both of these words, and not only the second, seem to have expressed originally the idea of warm or hot bathing. The old High-German word "*bayan,*" being the root of the old Saxon "*bath,*" Anglo-Saxon "*boeth*" and English "*bathyn,*" meant, as it still does in German "*bähen*"—"to foment." The second of the two words in the Promptuarium, "*stuwyn,*" still preserved in our "to stew" and the noun "stove," has apparently lost its relation to our present-day conception of bathing, but in the period under consideration it had this significance. Originally derived from the old German "*stiuban,*" "*stieben,*" "*stoup,*" very likely related to the Anglo-Saxon "*steman,*" "*styman,*" and gradually transformed into the German "*stieben,*" "*Staub,*" and the English "steam," it came very early to designate a special locality, a hut in which steam was raised by pouring water on hot stones or heating it in

[3] "De Bello Gallico," vi, 21.

a kettle or tub.[4] Such lightly built huts we know to have existed, as they exist even in the present day in some countries; they formed the original German "*Badestube*." *A priori* we think of the vapour bath as an institution peculiar to the Slavic races and of the tub as the Germanic bathing implement. There cannot be any doubt about the antiquity of the Slavic and Finnish steam bath, but it is difficult to ascertain whether it preceded or followed the Germanic "*Badestube*." It speaks for the latter alternative that most Slav peoples, just as those inhabiting ancient Gaul, Spain, and even Italy, took up the Germanic term "*Stube*" for the designation of certain bathing arrangements. So we find it in the old Slavic words "*istuba*," "*izba*" (Lithuanian "*stuba*," Lettish "*istaba*," Finnish "*tupa*," Hungarian "*scoba*," old Prussian "*stubo*"), in the old French "*estuve*," old Spanish "*estufa*," and old Italian "*stufa*" and "*stufare*." It is curious that only in the modern Italian has this word preserved the significance of washing and bathing, while in the English, French, and German languages this sense has been lost altogether.[5]

But I must return now to monastic balneology. The full extent of the monastic movement and its significance to

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[4] In a manuscript of the British Museum (Harl. 2,378) the following description is found: "For to maken a dry Steuwe. Take a fatte (vat) and cover it o-bouen with clothis and take iii or iiii grete stones in the fyre; and whanne yei ben hote I-nowe, ley oper colde stones in ye fattes botume, and the hote abouen and sette a stole besyden and go into ye fatte, and setto ye on y stole; and take a lavour fulle of colde water in thyn hande, and ay as you will have it hattere poure a litill of ye watere yere-on; and yus is made, or elles ley vm (around—the German *um*) ye hote stones herbes yat are beste for bathes." (Transcription in G. Henslow's "Medical Works of the Fourteenth Century," London, 1899, p. 100.)

[5] In Richard Hakluyt's "Voyages" and Purchas's "Pilgrimage" (16th century) the words "stoue" and "bath stoues" are still used in the old sense.

the organization of a new order of things is not always realized. Most of the monasteries were built between the years 520 and 700. From the sixth century to the beginning of the fifteenth 15,070 monasteries were counted in Christian Europe, which had a total population of only 15,000,000 in the thirteenth century, according to Walsh's estimate. These figures alone give an idea of the tremendous potentiality of these institutions. As to the quality of this influence opinions have differed, as a great deal of adverse criticism was brought forward against them and led to their dissolution in some countries. The debate on this subject is still on and does not concern us here, but to the unbiased student of mediæval history it is very apparent that the beneficial effects of monastic activities in so many fields of human endeavour through centuries far outweighed any pernicious ones due to those shortcomings and abuses which are unavoidable in any large organization. We have only scantily written records of the early medical activities of the monks. Their scriptoria during the 900 years prior to the advent of the printing press have supplied the greater part of the literature, which dealt mainly with theologic and philosophic subjects, while the monks attended, unrecorded, to their samaritan duties. To reconstruct this part of their activities we have to look for another kind of record. We can find it if we study the structural arrangements of the monastic buildings in some of the ancient plans which, fortunately, have been preserved, while hardly anything has remained of the oldest buildings themselves. The oldest extant plan of such a convent, founded in the year 820, is that of Saint Gall in Switzerland. By a comparison with still remaining foundations of older as well as more recent convents, this plan has been shown to represent the building type adhered to in most of the monasteries

of the Middle Ages. By a careful selection of the site, due regard to the sizes and convenient distribution and location of the rooms according to their purposes, and by a scrupulous attention to an abundant and healthy water supply, its canalization, proper sewage disposal, &c., the builders of these monasteries showed an extraordinary insight into hygienic requirements. Alfred Martin, in his beautiful book on the history of German balneology,[6] has given a detailed description of the bathing facilities provided. In some instances he had to compare the inscriptions on the original plan with other documentary evidence to make them clear. He has succeeded admirably, and I cannot do better than follow his description.

The convent of Saint Gall comprised several larger and smaller buildings grouped around the church. The more important ones were connected with each other by covered passage ways. Bathing facilities were provided in special and separate structures for the four principal buildings, viz., the dormitory of the monks, the house of the novices and students, the infirmary, and the servants' house, with which some were connected by means of closed-in passage ways, or directly accessible through a door. The largest, the bath house for the monks, was divided by a wall into two compartments. In the plan benches are indicated against the four walls of both rooms; one room has in its centre a square object, while two round ones are indicated near the middle of the other. The whole place is called on the plan "balneatorium et lavandi locus." The view has been expressed (Kochendörfer) that this bath house was connected by means of hollow flues with the heating plant below the dormitory

[6] Martin, Alfred: "Deutsches Badewesen in vergangenen Tagen," Jena, Diederichs, 1906. With 159 illustrations from old originals.

("subtus calefactoria domus supra dormitorium"), and so might have served as a sudatorium. But this seems unlikely, because of the distance from the calefactorium. It seems more plausible that the square object in the first room was a hearth or stove on which water was heated in kettles to be used for bathing in the round tubs in the adjoining room. An amusing story, told by an ancient chronicler of the monastery, Ekkehard, supports this explanation. A stranger, speaking only the Romance tongue, was one day brought in a wheelbarrow to the convent praying for admittance. He claimed that both his legs were paralysed. He was received kindly and a bath prepared for him. After his portly person had been put—not without trouble—into the tub he complained that the water was too hot; in his mother tongue he shouted "Cald, cald est," whereupon the accommodating monk fetched "the sizzling kettle" and poured some more hot water into the tub. More vigorous yells of "Cald est" and more hot water until the stranger, forgetting his lameness, jumps out of the scalding water—an early example of successful psychotherapy!

But to return to the convent plans. We have a direct record that a patron of the monastery had provided for use in its bathrooms ivory combs to be attached by metal chains, as well as towels for each monk. Another building annexe contained the privy (necessarium) with separate seats (sedilia). The infirmary formed an interesting building complex apart: it comprised the hospital proper with separate and easily accessible bathroom, single rooms (probably for isolation), the refectory, and chapel. Entirely separate but close by stood the physician's house with its garden of simples, and another structure "for blood-letting," probably a sort of surgery. In the other houses certain rooms were also used for bathing, blood-letting, and

cupping—as, for instance, in the house for travellers and poor guests (domus peregrinorum et pauperum).

We see that in this plan very excellent provisions had been made, and it needs no very vivid imagination to picture the mode of their current utilization. Their repetition in other monasteries through long periods of time suggests that they proved satisfactory and answered deeply rooted requirements. Similar planning we find in a sketch on a psalter for the twelfth-century Abbey of Canterbury, and this is confirmed also in several Cistercian convents at Clairvaux, Citeaux, and other places.[7] That in some of the religious orders of the time no such attention was given to bodily care cannot be denied. Also, it must be remembered that abstention from bathing was considered by some ascetic individuals as a high virtue, in line with other self-inflicted discomforts and pains. Thus Thomas à Becket's saintliness became immediately clear to those who cared for his body immediately after his murder—it was covered with filth and vermin! Similarly, the story of the pious monk who warded off the amorous advances of a worldly lady by letting her glance underneath his cassock! Such occurrences were exceptions, and must be recognized as such; they only enhance the prevalence of opposite habits.

The continued provision of these monastic bathing arrangements in the setting we have tried to describe by itself suggests that ample use was made of the baths for medical purposes. It was probably here where the artificial baths, the salt baths, the herb baths, which came to enjoy such general popularity, were elaborated. Also by settling near famous old mineral springs did the monks promote

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[7] As late as 1403 the Cistercian "Hirschberg Warmbrunn" flourished as a watering place.

that particular feature of balneology which still enjoys a considerable vogue.[8] That they made use of cold bathing therapeutically may be suggested by a passage in a letter of Arnulf, Bishop of Lisieux, to Pope Alexander III (1159-1181), asking for the dissolution of the Benedictine Abbey of Grestain, because of the misconduct of the monks, charging that they had killed a sick woman by immersing her in a cold bath under pretext of a miraculous cure.

Parallel with, influenced, and fostered by monastic balneology, the various hygienic and therapeutic measures within its range developed among the peoples of Germany, France, and England very similarly. Kings and princes of State and Church helped the development in many ways.[9] Already Charlemagne, like Theodoric, showed his interest. It was the attraction of the hot springs at Aachen that induced him to erect a palace there.[10] His legendary con-

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[8] A great many interesting details can be found in B. M. Lersch's "Geschichte der Balneologie, &c.," Würzburg, Stahel, 1863. Thus the hot springs of Luxeuil were the property of the monastery founded by St. Columban in 615. The Benedictines from earliest times showed a special interest in mineral springs. Those of Arles, in French Provence, belonged to them in 786; about the same time also those of Burtscheid, which later was transferred to an order of nuns. The famous saline spring of Kissingen already in 823 belonged to the Benedictine Abbey of Fulda. The springs of Pfeffers, which Paracelsus preferred to all others, belonged to a monastery as early as the eleventh century. The Roman thermae of Bath were restored by Bishop Joannes, of Tours, in 1090, and connected with his palace. His successor, FitzJocelyn, utilized them in his Abbey, and up to 1544 it remained monastic property.

[9] We have reports of several early papal efforts in this direction. Hilarius (464) built for the monastery of St. Lawrence special bath-rooms; Hadrian I (759) and, similarly, Gregory IV (844) recommended to the clerics the regular processional to the baths.

[10] An interesting poem by the Benedictine Guinterius Ligurinus dealing with the baths at Aachen in 1152, at the coronation of Frederic Barbarossa, is given by Lersch (*op. cit.*).

nection with the still famous waters of Karlsbad is well known. Already in Merovingian times the Lex Allemanorum and Bajuvorum made specific provisions for the bath houses. A special profession, that of the "balneator," the "Bader," sprang up, which later—at least in Germany—formed a special guild besides the barbers and surgeons, complicating still more the already complex feuds between these two. Knighthood, though "in flower," is usually thought to have dispensed with bathing. The Minnesingers, troubadours, and minstrels, however, are not responsible for this tradition of hydrophobic propensity among their heroes. Many of their songs mention bathing. The Order of the Bath, although created only in the eighteenth century, has surely its origin in the Middle Ages. The obligatory bath for the Knight-Bachelor on the day before his admittance to full knighthood had surely more than a symbolical meaning. The yearly pilgrimages to the healing springs in the month of May, the baths of the women on St. John's Day, which Petrarca describes so picturesquely in one of his letters from Cologne, were ancient survivals, indications of a deeply rooted love for and belief in the purifying powers of the liquid element. These seasonal wanderings to the healing springs were naturally brought into relation with astral conjunctions, a tendency soon exploited by the calendar makers and astrological physicians. Days and hours were set for bathing, blood-letting, cupping, and purging, carefully ascertained by the position of the stars. Martin in his book gives a great variety of such instances which offer interest from many points of view.

The desire for a more accurate understanding of the agent employed with the intent of greater precision in its therapeutic application is a purely human tendency, and

not confined to the enlightened stage of civilization which we believe we have reached. If we take the trouble of searching we encounter it everywhere, also in the Middle Ages. With the establishment of medical schools this tendency becomes focused, and multiplying records of efforts allow us to analyse the results. The first contributions in this direction we should expect from Italy, the cradle of European culture, and particularly from the south, the old "regno," where at Salerno the first medical school arose. From the medley of component elements—Lombard, Norman, Teuton, Italian, Greek, and Saracen—it is not always easy to trace the prevailing factors to their origin. We know of the great Hohenstaufen Frederic II's admirable regulation of medical study and medical affairs generally, in Salerno as well as Naples. But that happened only in the thirteenth century, and the Hippocratic community had then already existed for at least 300 years. Whether of autochthonous or other lay origin, or created through monastic influences, notably of those exerted by the settlement of Benedict of Nursia on Monte Cassino, are still open questions, but there can be no question about the importance of the Salernitan school in the tenth century. Placed charmingly near that lovely bay of azure sea, under cloudless skies, and well sheltered from the cold tramontano amidst luxuriant vegetation, Salerno attracted already in the early days of the Norman adventurers the weary and sick, thus forming the prototype of the climatic resort. The tendencies of the medical school were in the direction of Hippocratic dietetics, and only in later days influenced by Arab teaching. And just as we have missed in Hippocrates a marked interest in balneology, it also is lacking in Salerno. The famous "Regimen sanitatis," the popular code of health

for the entire mediæval period, barely mentions bathing. This is rather surprising, but there seems to be an explanation for this puzzle.[11]

Salernitan affairs were not entirely devoted to the pursuit of high humanitarian ideals; there entered commercial considerations equally. Salerno could offer the best medical and surgical skill of the day, together with the advantages of a superior climatic resort. In these two factors it had to fear no competition. But to the north, across the hills and bay, was her natural rival, Naples, close to a district famed from ancient times for the immense variety and number of its mineral springs. Puteoli, Sulfatara, Cumæ, Bajæ were some of the names of far-famed springs which must have had an irresistible attraction to many seekers after health. In this we must see the explanation for Salerno's surprising attitude towards bathing, and this view is strengthened by some evidence showing that Salernitan adherents even used aggressive methods to damage her rival.[12] How successful Naples was in the competition with her powerful neighbour is difficult to say. But we have evidence that a

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[11] The rôle played by the Benedictine order of Monte Cassino in the foundation of the medical school of Salerno is not yet definitely ascertained. Its creator, Benedict of Nursia (543), is known to have recommended baths to his friars. Some time later elaborate bathing facilities were provided at Monte Cassino. That in this direction some influence was exerted on Salerno is suggested by an Act of 1110, which mentions "balneum monasterii quod de S. Sophia dicitur," also a lease to a Benedictine (1164) of a separate bath house with heating facilities, probably open to the public (from documents brought to light by Garufi: "Studi medievale," Milan, 1904-5, vol. i, p. 276). The Jewish traveller, Benjamin of Tudela, who visited Salerno late in the twelfth century, reports about petroleum springs and their therapeutic utilization. There may have been a greater balneological activity in Salerno than appears from the medical writings.

[12] It is reported that they destroyed the marble tablets on which directions were given for the use of the baths.

balneological activity extended through a long period of time. It certainly has furnished us with the first balneological literature. Like the "Regimen sanitatis Salernitanum," it is a poem which enumerates the different springs by names which are not always clear, describing their characteristics and their efficacy in the different diseases for which they are recommended. We possess several versions of it in manuscript. One version, of which the manuscript seems to be lost, was published in print in 1475 by Giovanni Elisio, a Neapolitan physician. It is easily accessible now in the collection "De Balneis" of 1553, where it is attributed to Alcadinus poeta Siculus. Its metre, language, and descriptive power speak well for its author, whom we find it difficult to identify. Giacosa[13] has brought to light from the codices of the Angelican Library in Rome, together with most interesting contemporary paintings, an account of the baths of Pozzuoli and their uses, which corresponds fairly closely with the subject-matter of the poem of Alcadino. The author in one manuscript is called "the physician Giovanni,

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[13] "Magistri Salernitani nondum editi," Torino, Bocca, 1901 (pp. 333 and 341), the reproductions of the miniatures in the separate Atlante, Folio, tavole 28 to 33. There are eighteen miniatures in the Codex Rome (Biblioth. Angelic.) 1474 of the thirteenth century. They are finely painted in tempera of beautiful colouring, the background in gold (black in photographic reproduction). They represent in the primitive art of the time the different baths in use. In the text (p. 341) the author is given as Alcadinus, but in one of the last verses one reads: "Ebolei vatis Cesar reminiscere vestri." Giacosa thinks that this points to Pietro da Eboli's authorship, although in other versions (De Balneis," 208) instead of "Ebolei" stands "Euboici," which conveys a much clearer sense, referring to the ancient tradition of the Eubœan land (Cumæ), instead of to Eboli, situated some ten miles from Salerno. De Renzi ("Stor. docum. Salern.," p. 409, and "Coll. Salern.," vol. i, p. 288, was the first to attribute the poem to Pietro da Eboli by a very plausible argument which has been accepted by many (*see also* Choulant, "Bücherkunde," second edition, p. 313).

son of the physician Gregory." Giacosa believes that he has traced both versions to one common source, to a Pietro da Eboli, a physician who had occupied distinguished positions in the reign of Frederic II and Manfred. But he has evidently overlooked the fact that the Alcadino version is clearly dedicated to "Henricum Imperatorem," which can mean only Henry VI, in whose reign Sicily became part of the Empire in 1194. This would place the author of the poem into a time prior to that of Frederic II and of Pietro da Eboli. But the origin of the poem is probably still earlier; the fact alone that we have so many attributions speaks for it. Ugolino da Montecatini, of whom we have still to hear, found another version attributed to Matteo da Plantimone, also in another manuscript. He published it in his balneological treatise, which also is reprinted in "De Balneis." Treating of the same subject and districts, all these versions have naturally many points of similarity; but even if they can be shown to be derived from a common source, they vary enough to allow the supposition that the variations represent actual changes in the balneological practice in the course of time.

The diseases that stand out in this poem as the ones most likely to be benefited by the use of the various baths are: the group of skin diseases, very prevalent at the time, scabies, and leprosy; then come the rheumatic troubles and gout, then the "struma," by which term various ailments, not only goitre, were designated, especially glandular swellings of the neck, and for which also the term "scrofa" was employed. Furthermore, we find the various female disorders, the different fevers, malaria and its sequelæ, the febres hecticæ, consumption of the young and old, rheumatism, and gout. The distinction of the different springs at that time was probably made only by eye, feeling, and

taste. Only Paracelsus, much later, provides the chemical test for iron waters. But these older balneologists with the crude means of distinction managed to differentiate clearly between nitrous, saline, aluminous or styptic, sulphurous, and bituminous waters. Two of the versions mention a Balneum petrolio, situated near Cumæ, that place across the hill from Pozzuoli on the open Mediterranean where Eubœan barks discharged long ago their crews and goods to implant Greek culture on Italian soil. Petroleum and asphaltum sources were known to Pliny under the general term of bituminous, but their employment *in status nascendi,* I believe, is a novelty peculiar to our poem. The Angelican version and that of Plantimone, not the one of Alcadino, mention iron springs.[14] The omission in the latter may also speak for its earlier date, inasmuch as the spring mentioned is not in the Pozzuoli district. All the versions mention the Balneum tripergulæ, called so, perhaps, because of the triple arrangement of its rooms after the Roman system—viz., dressing-room, calidarium, and frigidarium. It is situated near Averna, that sinister sheet of water which no bird can cross alive. Marking from oldest times up to Dante, who visited it—the entrance to the inferno, legend-enshrouded—it was also the favourite dwelling-place of the Sibyl of Cumæ, to whom Christ appeared here one day, as is recorded in our poem. I have visited what remains of these baths on the back of a sturdy Neapolitan, for its floor is under 2 ft. of water. Hewn into lava rock, with its passages, rooms, and reclining seats, it is interesting enough, but as to its antiquity and former purposes I should

[14] The bath is named "Balneum resina ferruginosum," which may point to the still-existing Resino at the foot of Mount Vesuvius (Giacosa).

not like to express myself without much closer archæologic scrutiny. Several of the thirty and more baths enumerated in the different versions of the poem cannot be identified thus far; perhaps someone will do it and increase our knowledge of this most interesting colony of baths.

Francesco da Piedimonti, born at San Germano in the district that has just occupied us (he died in 1320), was a famous pupil of Salerno in the time of its decline. Favourite and physician to the second Angevin King of Naples, Robert,[15] he became Professor of Medicine at the Neopolitan "studio."[16] He is the first among Salernitans to do justice to the baths of Pozzuoli and to balneology in general. Although particularly adept in obstetrical practice, he has written a general medical treatise. The balneological part of this, reprinted in "De Balneis," is worth while reading. The space is lacking for a detailed analysis here. I will note only his reference to blood baths, said to be used by the Sicilians in the treatment of leprosy, thereby touching upon an ancient tradition, probably of biblical and talmudic origin.[17] Interesting also is his balneologic treatment of senile hectics, his description of a great number of mineral waters, and his directions for the preparation of artificial ones.

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[15] Not of the Norman Robert and not of the King of Sicily, as sometimes stated. Robert Guiscard was dead almost 100 years, and Charles of Anjou had to relinquish Sicily after the "Vespers" (1282), so that none of his successors up to the year 1442 could claim that title.

[16] In 1225 Frederic II had founded the University, but in 1231 he transferred the teaching of medicine from Naples to Salerno with exclusive privileges. Only under Angevin rule, in 1266, the Neapolitan school was again established.

[17] For further details see J. Preuss, "Biblisch-talmudische Medizin," Berlin, Karger, 1911.

The work of a man like Francesco makes us regret that we have so little information about the school of Naples, which, visited by great scholars, Thomas Aquinas and Arnoldus de Villanova amongst them, must have exerted a considerable influence upon contemporaneous thought and achievement.[18] Salerno and the intellectual development in the north have distracted attention from it. There we find the oldest of the *studia generalia—i.e.*, the universities—Bologna, in fullest bloom, assembling already in the year 1200 as many as 10,000 students, so that a new one, fed by the overflow, becomes necessary, and is established in Padua (1222). The intellectual horizon was widening, the Crusades had brought Orient closer to Occident, Arabian learning was becoming firmly implanted upon European soil. It brought ancient learning, and especially medicine, to a more general appreciation, but also the scholastic method, with the tediousness of its syllogistic and subtilissimistic argumentation. Whether balneology developed by all this it is hard to decide. At any rate, the balneology of the earlier Middle Ages was slowly evolving from a simple handmaiden of plebeian antecedents into the favourite courtesan of the ruling classes, intellectual, secular, and ecclesiastic. Signs of degeneracy gradually became apparent, the increasing licentiousness found a suitable field for free indulgence in the opportunities offered in the public bathing places which had sprung up everywhere in towns as well as in spas, and where males and females mingled freely

[18] Arnoldus, in his "Breviarium practicæ" (Pavia, n.d.; Ven., 1494, 1497), refers to his sojourn and study in Naples. He mentions his medical teacher, Casamida, and also recommends the baths of Pozzuoli, especially for renal and vesical calculus. The life-history of this most eminent physician is not yet definitely ascertained, and especially his Neapolitan sojourn and his authorship of the "Breviarium" are still *sub judice*.

in and out of water in Paradisian garb. This, however, indicates only one tendency more pronounced in some places than others, and does not allow generalization. But it presages coming trouble fostered by protracted wars, pestilence, and difficult financial conditions. The greatest blow to balneology, apart from the increase of the cost of fuel, came at the end of the fifteenth century with the alarming spread of syphilis, which was thought to have been fostered through infection in the bathing places.

During the 200 years which preceded the end, and for some time afterward a great number of balneological writings were produced; some are still extant in manuscript form only, but most of them have been printed. The baths situated near the great centres of learning, Bologna, Padua, Perugia, Florence (Pisa and Lucca), Pavia, Siena, and in France Montpellier, which was gradually taking the position Salerno occupied, received, naturally, the painstaking attention of the medical men engaged in teaching and practice there. Thus we are particularly well informed about such springs as those of Porreta, Abano, Lucca, Corsenna, Avignon; but also from across the Alps, and, in fact, from everywhere in civilized Europe can we now find writings about old and new watering-places. The intellectual giants representing the best medical thought in the thirteenth century were Taddeo Alderotti (1223-1303) in Bologna and Pietro de Abano (1250-1315) in Padua. Taddeo, a man of monumental learning and colossal fees, is largely responsible for the introduction of the scholastic method into medicine. It was the lawyer's method, highly cultivated in the Bolognese school, which primarily was a law school. The prolonged and subtle analysis of traditional information is difficult for us to understand, brought up as we are to consult only direct evidence, even if we do go to very great length

and finest distinctions within this field. To record the various stages and final results of scholastic argumentation must have taken an immense amount of time, and it is astonishing that occasion was found at all for personal observation and experimentation. Not much of the latter we find in Taddeo himself, but in some of his pupils. Pietro de Abano exerted an equally strong influence mainly arabistic. Although hailing from the place of ancient thermæ, which we have already encountered, he does not seem to have had a special leaning towards balneology, but of course he does argue about it. Pietro de Torrigiani, a prominent pupil of Taddeo's, wrote the "Canones balneandi," rules for bathers which enjoyed great vogue throughout all Europe. Another one of Taddeo's pupils, an enthusiastic admirer of Pietro de Abano, was Gentile da Foligno (died 1348), also a great money-maker and promoter of the logical against the empirical method in medicine. He wrote a little treatise on the waters of Porreta, the chief interest of which may be found in the fact that it was the first to appear in print (1473). In Giovanni de Dondis we usually hail the early apostle of exact balneology. Whatever his right to such honour may be, it must be mentioned that it rests on his attempt to extract the salts of the thermæ of Abano. He was a serious man of a very great reputation, an opponent to polypharmacy, and much thought of by that great hater of physicians, Petrarca. Of similar type, though much later, is Michele Savonarola, representing Padua and the new school of Ferrara. To him European balneology owes the most ambitious work on the mineral springs of all the countries. But the man who in his personality has been brought closer to us than any other physician in mediæval times through happy finds in old archives is Ugolino Caccino, of Montecatini (died 1425).

He came from that thermal district not far from Florence, in the Valdinievole, which has still preserved its ancient reputation as a spa. Evidently he was a man of broad and open-minded scholarship, who in his treatise on all the Italian spas, the first thorough one of the kind, gives the results of his own personal observations, stating clearly when he is reporting from the information of others. This treatise formed the basis of later writings, the authors of which did not find it necessary to cite Ugolino, "imitando la vecchia cornacchia della favola, che si faceva bella delle piume non sue."

Many others who wrote on the subject I could name, up to the time when Thomas Giunta, "for the good of humanity," but also to put into proper relief the balneological resources of his country, assembled all their writings in his imposing collection, "De Balneis."[19] Matteo Bendinelli (1489) sums up for them all, in his treatise on the baths of Lucca and Corsenna, the general tendency of that time, which I believe approaches very closely our own: "And as it is impossible for the physician to cure any ailment without knowing the disease, so it is impossible for the physician to acquire honour from the employment of baths without knowing their minerals." But there is also a human side touched upon in some of the treatises in "De Balneis" which it would be difficult to find in any modern treatise. I cannot refrain from calling attention to one, to that delightful *confabulatio* which gives an account of a three-days' visit of inspection to the baths of Caldariani by what we might call a balneological commission of prominent

[19] "De Balneis omnia quae extant," Venice, Giunta, 1553, fol., 497 leaves. This fine collection, the first text-book on balneology, offers to the interested student a mine of information.

citizens of Verona. Pantheus, the humanistic spokesman; his responsors, the erudite magistrate, Hermolaus Barbarus; Aleardus, the local physician; and several other worthy gentlemen address each other in classic Latin. The dialogues have to be read to be appreciated; they give a beautiful insight into the manners and ways of the times. The conversation dwells on all the famous Veronese, on Pliny, on Macer, on Catullus, on Vitruvius, on all those who in ancient times had written or sung of the virtues of the waters and the glorious beauty of the land. Virgil and Ovid and the other bucolics are freely cited, and we hear of delightful promenades in the early morning hours, of delicious feasts at other times—in general, a charming picture of rural bliss in the setting of the classical spirit of the Cinquecento without any tedious insistence on the technical consideration of the spring itself. Although we do not find this sort of balneological report in our scientific annals, let us hope that the sense for it is not entirely lost. There are other things but pure facts worth considering.